The Claims

What is claimed is:

1. A writing current circuit (42) adapted for supplying a controlled electrical current to a laser diode (34) included in a drive (10), the drive (10) being adapted for swiftly recording digital data onto a Digital Video Disc ("DVD") (16), the writing current circuit (42) receiving from a control processor (14) included in the drive (10) both:

a. write control digital data via a writing control bus (44) which interconnects the writing current circuit (42) and the control processor (14); and

b. serial digital data to be recorded on a DVD (16) via a recorded data bus (46) which also interconnects the writing current circuit (42) and the control processor (14),

the writing current circuit (42) comprising:

a plurality of thermometer code registers (52) each of which is adapted for storing a numerical value which specifies a particular quantity of electrical current which the writing current circuit (42) may supply to the laser diode (34), the thermometer code registers (52) respectively receiving the stored numerical values from the control processor (14) via the writing control bus (44);

a current control register (58) which is adapted for receiving a numerical value from a selected one of the thermometer code registers (52) via a thermometer code transfer bus (56) which interconnects the current control register (58) with all of the thermometer code registers (52), serial digital data received by the thermometer code registers (52) via the recorded data bus (46) specifying a sequence in which individual thermometer code registers (52) supply respective numerical values to the current control register (58) via the thermometer code transfer bus (56) whereby the writing current circuit (42) supplies a particular electrical current waveform to the laser diode (34); and

a plurality of separate current sources (62) each of which receives a single output signal from the current control

register (58), the output signal respectively received by each current source (62) from the current control register (58):

a. when in a first state activating the receiving current source (62) for supplying a particular quantity of electrical current to the laser diode (34); and

b. when in a second state deactivating the receiving current source (62) for supplying the particular quantity of electrical current to the laser diode (34).

2. The writing current circuit (42) of claim 1 wherein each of the thermometer code registers (52) is a logical register that includes at least pair of physical registers (52_1, 52_2), at any instant in time:

a. a first of the physical registers (52_1, 52_2) storing the numerical value which is transferrable from the logical thermometer code register (52) to the thermometer code transfer bus (56); and

b. a second of the physical registers (52_1, 52_2) being available for storing a new numerical value received from the control processor (14) via the writing control bus (44);

whereby each thermometer code register (52) is adapted for supplying the numerical value to the thermometer code transfer bus (56) from the first physical register (52_1, 52_2) while the second physical register (52_1, 52_2) concurrently receives the new numerical value from the control processor (14).

3. The writing current circuit (42) of claim 1 wherein each current source (62), in addition to receiving a single output signal from the current control register (58), also receives both:

a. a first current reference voltage signal which controls how much electrical current the current source (62) supplies to the laser diode (34) when the single output signal received by the current

source (62) from the current control register (58) is in the first state; and

b. a second current reference voltage signal for controlling the charging electrical current supplied to the laser diode (34) by current source (62) when the single output signal received by the current source (62) from the current control register (58) initially enters the first state, whereby the writing current circuit (42) is adapted for providing the same rise time and same overshoot for electrical current supplied to the laser diode (34) regardless of how much electrical current the current source (62) supplies to the laser diode (34).

4. The writing current circuit (42) of claim 3 wherein digital data from the control processor (14) adjusts both the first current reference voltage signal and the second current reference voltage signal.

5. The writing current circuit (42) of claim 1 wherein each current source (62) includes at least one metal oxide silicon ("MOS") transistor (142') having a gate, a source and a drain, electrical current for the laser diode (34) flowing through the MOS transistor (142') between the source and the drain thereof, the MOS transistor (142') including a well of semiconductor material formed with a first dopant material, the well of semiconductor material being established in a substrate of semiconductor material containing a dopant material which complements the first dopant material, the current source (62) further including a resistor connected between a source of electrical power for the writing current circuit (42) and the well of the MOS transistor (142'), whereby the resistor in combination with inherent source to well parasitic capacitance of the MOS transistor (142') form an embedded low pass filter.

6. A method for operating a writing current circuit (42) that is adapted for supplying a controlled electrical current

to a laser diode (34) included in a drive (10), the drive (10) being adapted for swiftly recording digital data onto a DVD (16), the method comprising the steps of:

the writing current circuit (42) providing a plurality of thermometer code registers (52) for respectively receiving and storing a numerical value which specifies a particular quantity of electrical current which the writing current circuit (42) may supply to the laser diode (34);

the writing current circuit (42) receiving from a control processor (14) included in the drive (10) both:

a. write control digital data including numerical values which are received into and stored in the thermometer code registers (52); and

b. serial digital data to be recorded on a DVD (16);

the writing current circuit (42) further providing a current control register (58) for receiving a numerical value from a selected one of the thermometer code registers (52);

the writing current circuit (42), receiving from the control processor (14) serial digital data for specifying a sequence in which individual thermometer code registers (52) supply respective numerical values to the current control register (58) whereby the writing current circuit (42) supplies a particular electrical current waveform to the laser diode (34); and

the writing current circuit (42) also providing a plurality of separate current sources (62) for respectively receiving a single output signal from the current control register (58), the output signal respectively received by each current source (62):

a. when in a first state activating the receiving current source (62) for supplying a particular quantity of electrical current to the laser diode (34); and

b. when in a second state deactivating the receiving current source (62) for supplying the particular quantity of electrical current to the laser diode (34).

7. The method of claim 6 wherein each of the thermometer code registers (52) is a logical register that includes at least pair of physical registers (52_1, 52_2), the method further comprising the steps of at any instant in time:

a. a first of the physical registers (52_1, 52_2) storing the numerical value which is transferrable from the logical thermometer code register (52) to the current control register (58); and

b. a second of the physical registers (52_1, 52_2) being capable of receiving from the control processor (14) and storing a new numerical value;

whereby each thermometer code register (52) is adapted for supplying the numerical value to the current control register (58) from the first physical register (52_1, 52_2) while the second physical register (52_1, 52_2) is concurrently receiving the new numerical value from the control processor (14).

8. The method of claim 6 wherein each current source (62), in addition to receiving a single output signal from the current control register (58), receiving both:

a. a first current reference voltage signal which controls how much electrical current the current source (62) supplies to the laser diode (34) when the single output signal received by the current source (62) from the current control register (58) is in the first state; and

b. a second current reference voltage signal for controlling the charging electrical current supplied to the laser diode (34) by current source (62) when the single output signal received by the current source (62) from the current control register (58) initially enters the first state, whereby the writing current circuit (42) provides the same rise time and same overshoot for electrical current supplied to the laser diode (34) regardless of how much electrical current the current source (62) supplies to the laser diode (34).

9. The method of claim 8 wherein the control processor (14) supplies digital data for adjusting both the first current reference voltage signal and the second current reference voltage signal.

10. The method of claim 6 wherein each current source (62) includes at least one MOS transistor (142') having a gate, a source and a drain, electrical current for the laser diode (34) flowing through the MOS transistor (142') between the source and the drain thereof, the MOS transistor (142') including a well of semiconductor material formed with a first dopant material, the well of semiconductor material being established in a substrate of semiconductor material containing a dopant material which complements the first dopant material, the method further comprising the step of forming an embedded low pass filter in the current source (62) by including therein a resistor connected between a source of electrical power for the writing current circuit (42) and the well of the MOS transistor (142'), whereby the resistor in combination with inherent source to well parasitic capacitance of the MOS transistor (142') provides the embedded low pass filter.